



RESEARCH NOTE LS-22

LAKE STATES FOREST EXPERIMENT STATION • U. S. DEPARTMENT OF AGRICULTURE

Survival and Growth of 12-Year Hybrid Aspen  
Compared to Native Wisconsin Stock

In 1951, a small-scale test planting of several aspen hybrids and native aspen was established on the Argonne Experimental Forest in northern Wisconsin. The hybrids tested were: *Populus tremuloides* Michx. of Massachusetts origin x *Populus tremula* L. from Munich, Germany, and *Populus tremuloides* from Massachusetts x *Populus tremuloides* from Colorado. Native quaking aspen wildlings, *Populus tremuloides*, were used for a comparison. All stock was 1 year old at the time of planting.

Twelve years after planting, the hybrid of European aspen x Massachusetts quaking aspen was superior to native Wisconsin aspen in height, diameter, and percentage of survival; the native quaking aspen, however, had better stem form and considerably less canker. The Massachusetts x Colorado quaking aspen hybrid was a complete failure.

Statistics for the surviving hybrid and native aspens are as follows:

Species	Average height (Feet)	Average d.b.h. (Inches)	Survival (Percent)
<i>Populus tremuloides</i> , Mass. x <i>P. tremula</i> , Munich	24.4	2.9	59
<i>P. tremuloides</i> Forest County, Wis.	21.1	2.5	54

The two groups of hybrids and one group of native wildlings had been planted in 50-tree lots within a small deer- and rabbit-proof enclosure. The planting site was a sod-bound clearing formerly occupied by northern hardwoods. The soil is a loam of good fertility, but quite stony.

About 6 months prior to planting, the area had been disked, but exposure of mineral soil was estimated at only 50 percent. Trees were planted in deep holes and received no subsequent cultivation. All hybrids were cut back to the ground line 1 year after planting. This treatment was supposed to improve stem form, but it was ineffective.

Fourth-year survival and growth of this plantation was reported by Stoeckeler and Strothmann.<sup>1</sup>

<sup>1</sup> Stoeckeler, J. H., and Strothmann, R. O. Early development of native and hybrid aspens. U. S. Forest Serv., Lake States Forest Expt. Sta. Tech. Note 427, 1 p. 1954.

The three tree groups have continued to exhibit the same relative growth characteristics during the subsequent 8 years. The Massachusetts x Colorado hybrid was already decadent at 4 years. Mice and frost were the chief causes of early mortality among all three groups.

Although the survival of the hybrid of German x Massachusetts aspen has been better than that of native aspen, it may not maintain this favorable position much longer. This can be shown by plotting survival over time since planting (fig. 1). Mortality among the native aspen has nearly ceased, but mortality among the hybrids has continued at a nearly uniform rate.

This prediction is substantiated by a close examination of each surviving tree. One-third of the hybrids have hypoxylon cankers, whereas only one-ninth of the residual native aspen have cankers. Furthermore, some of the cankers on the hybrids are quite large, having maximum dimensions

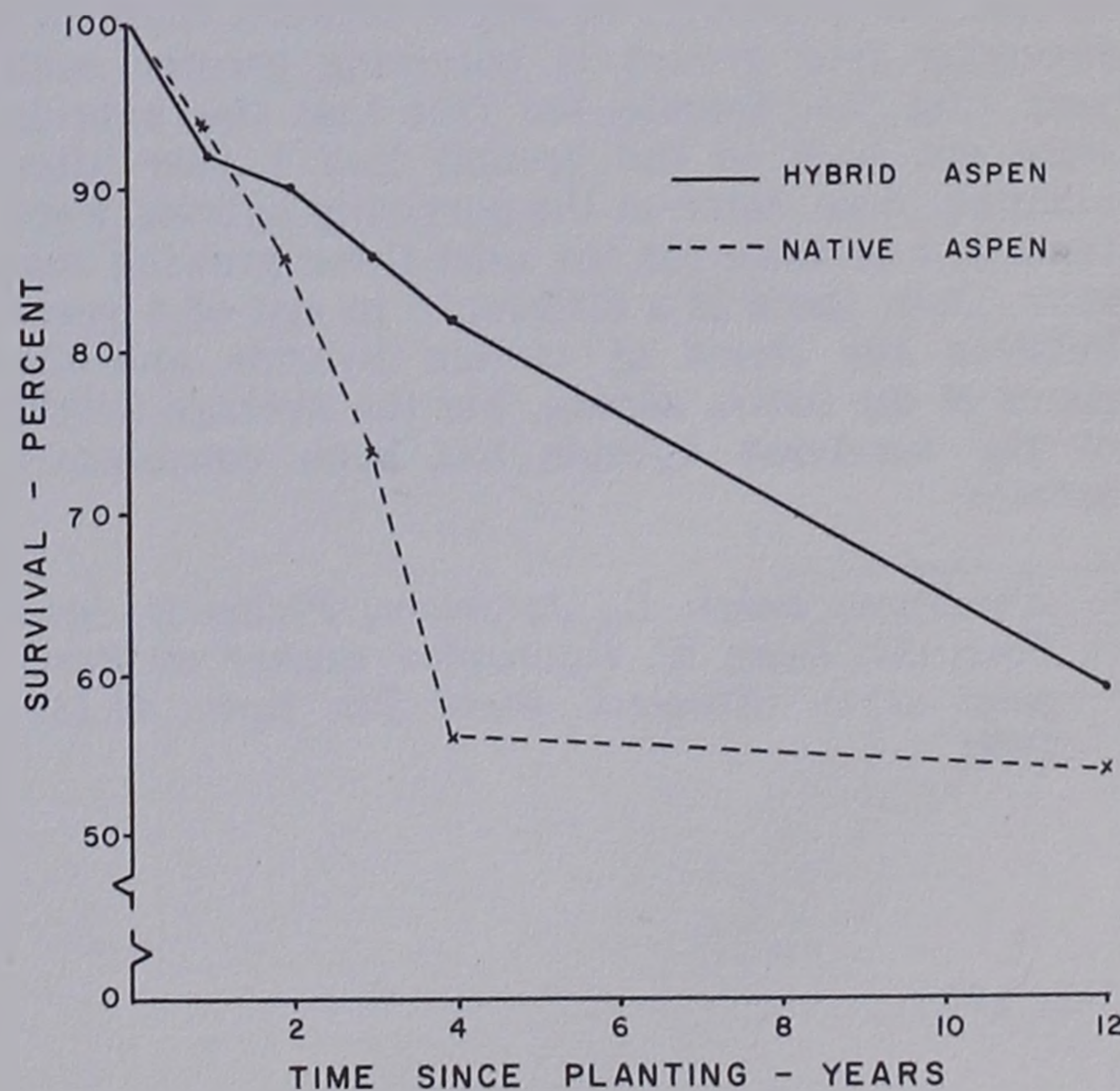


FIGURE 1. — Survival of hybrid and native aspens, by years, since planting.



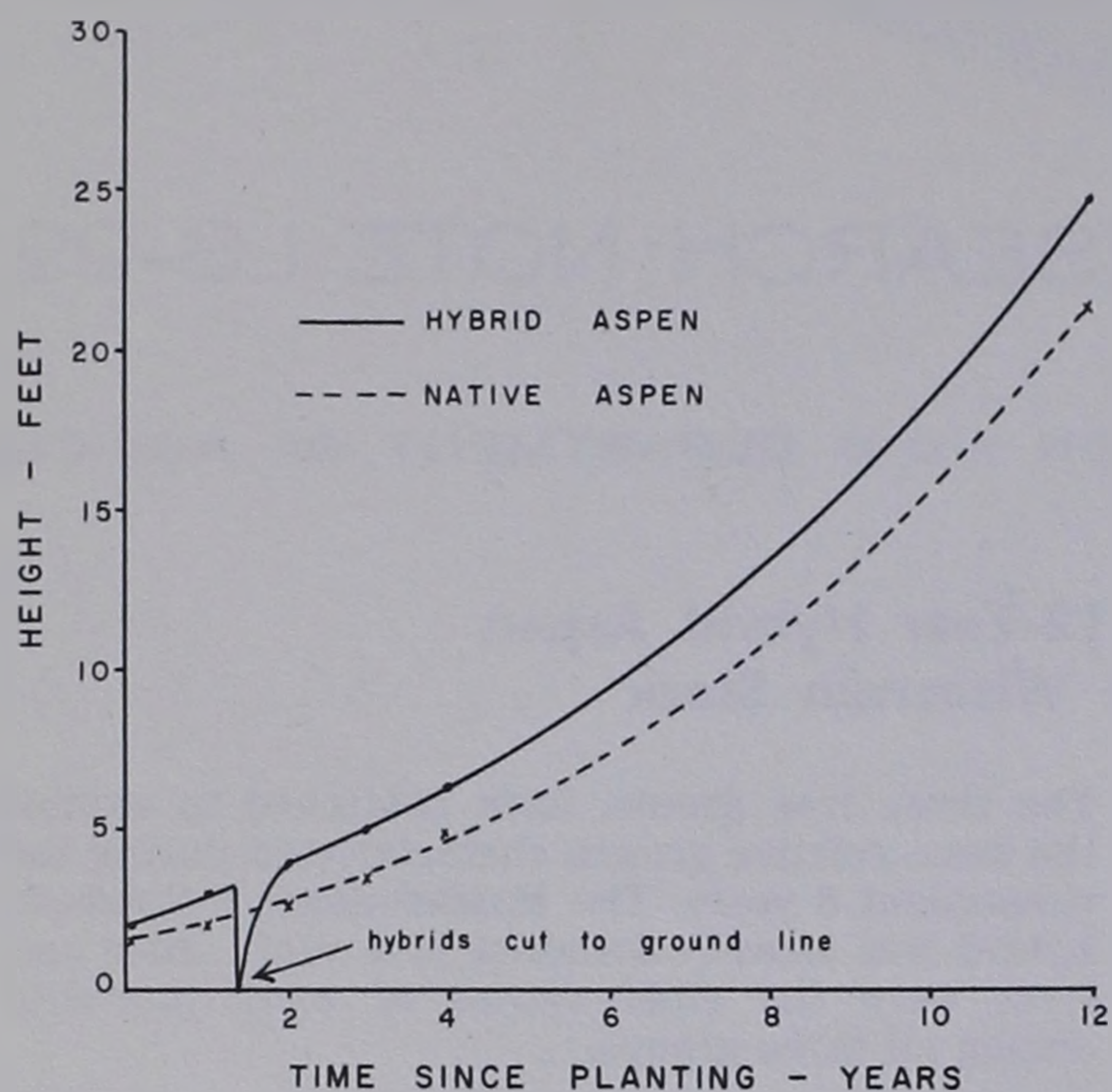


FIGURE 2. — Average total height of hybrid and native aspens by years since planting.

of 6x36 inches. The few cankers on the native aspens are all less than 2x4 inches. The incidence of *Hypoxylon pruina* on *Populus tremula* in Wisconsin has been reported by Anderson, Joranson, and Einspahr.<sup>2</sup> These authors indicated that the prevalence of infection on European aspen was comparable to that on trembling aspen of the same age. Therefore, *Populus tremula* cannot be considered as a source of hypoxylon canker resistance when used in crosses with native aspens.

The average total height of the hybrid has always been greater than that of the native aspen. In fact, the difference in height between these two surviving tree groups is becoming greater each year (fig. 2), despite the fact that the hybrids were cut back to the ground line 1 year after planting. Also, some of the surviving hybrids were top-killed by mice for the next three growing seasons. Thus, there is a difference in age of 4 years between the stems of certain hybrids and the stems of the native aspens. Yet the average height of the surviving hybrids has been consistently greater.

<sup>2</sup> Anderson, Ralph L., Joranson, Philip N., and Einspahr, Dean W. *Hypoxylon canker on European aspen*. Abstract. Plant Dis. Rptr. 44:132. 1960.

Stem taper of the hybrids is slightly less than that of the native aspens. This is shown by an illustration of height over d.b.h. (fig. 3). The curves showing these height-diameter relationships were developed from the following regression equations, in which Y equals height in feet and X equals d.b.h. in inches:

$$\begin{aligned} \text{Hybrids} \quad Y &= 5.00 + 9.9145 X - 0.9267 X^2 \\ \text{Native aspens} \quad Y &= 4.035 + 9.1755 X - 0.647 X^2 \end{aligned}$$

Although the hybrids have made better growth and have less taper, the native aspens have better stem form. Many of the hybrids have substantial crook and sweep and lean away from the prevailing wind. Some trees are forked. The native aspens, however, are generally straight and perpendicular. Also, all native aspens are single stemmed, whereas 13 percent of the surviving hybrids are multi-stemmed clumps. It is not known whether the basal sprouting is due to the practice of cutting back the stems, the subsequent rodent damage, or an inherent characteristic of this hybrid.

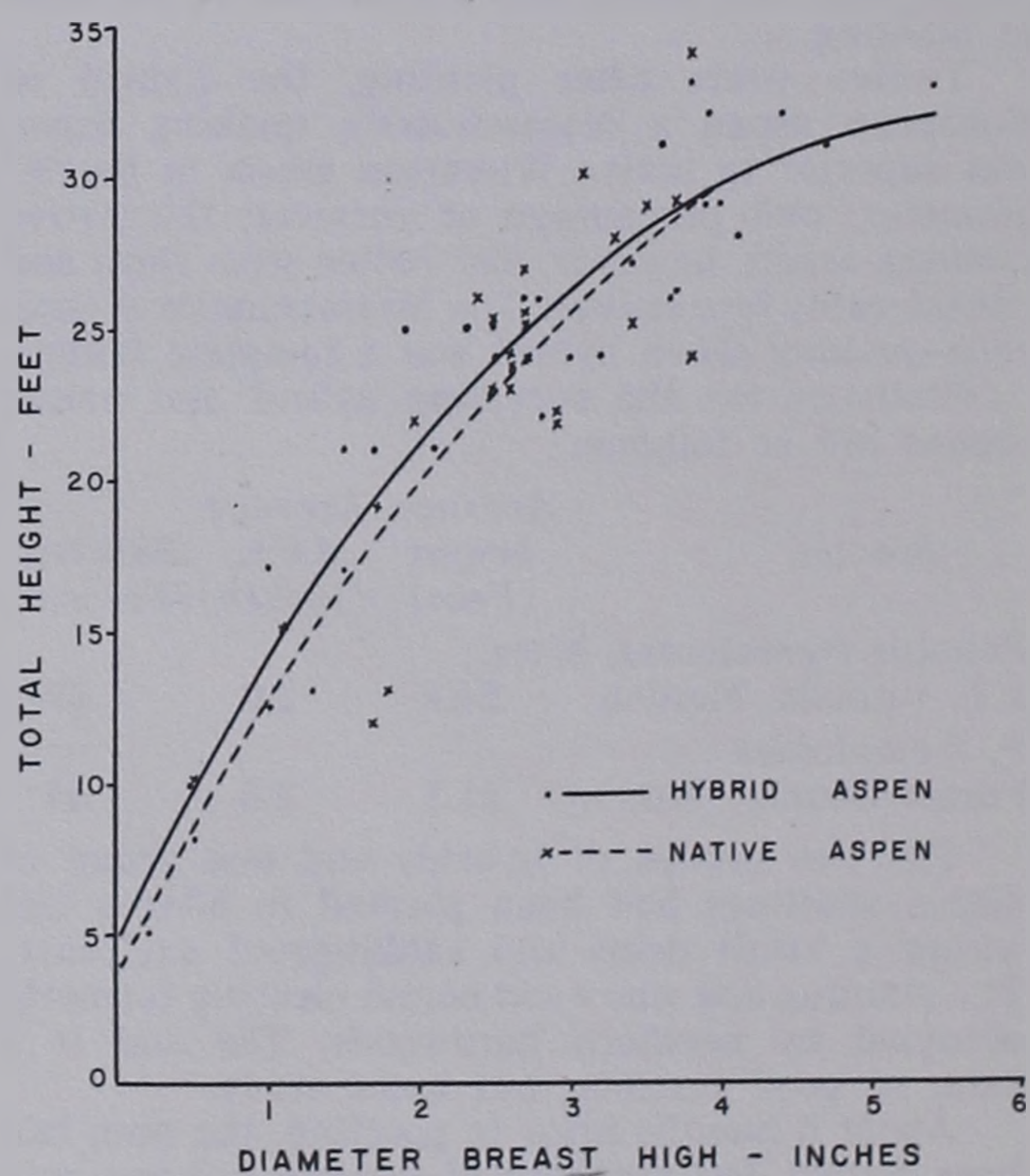


FIGURE 3. — Twelve-year height-diameter relationships for native and hybrid aspens.

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